

REMARKS

A brief summary of the claimed invention is warranted. Applicants disclose and claim that a physical catalyst in a chemical reaction system can be augmented by the exposure of the reaction system to at least one determined frequency. However, the claims recite not just any frequency, but rather, a very specific frequency (or combination of frequencies). The specific frequency (or combination of frequencies) exposed to the reaction system can, for example, correspond to at least one frequency that is characteristic of the **CATALYST** to augment the catalyst--that is to say, corresponding to the catalyst's emission or absorption spectrum. In other words, catalysis **IS** frequency specific, and that the frequencies desired to augment the functioning of a physical catalyst are those that are related to its emission/absorption spectrum.

§102 (b) REJECTION—TSUTSUI

Claims 1-4, 7-9 and 13 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,287,036 to Tsutsui et al (hereinafter referred to as "Tsutsui"). Applicants respectfully traverse this rejection.

MPEP §2131 provides: "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Contrary to the Action's conclusion that all elements of the claims are disclosed in Tsutsui, Applicants note that the frequencies disclosed in Tsutsui relate to a **REACTANT**, **NOT** A **CATALYST**. The rejection is unsupported by the art and should be withdrawn.

In particular, on first glance Tsutsui appears to be relevant. However, a more detailed reading unearths the true disclosure of Tsutsui. Tsutsui discloses the continuous regeneration of an "**ACTIVE REDUCING AGENT**" which is sometimes referred to in Tsutsui as a "catalyst." In particular, Tsutsui discloses certain transition metal alcoholates which are nothing more than a reactant. Tsutsui then regenerates the reactant alcoholate by a photo-reduction process. This is simply traditional photochemistry.

To assist the Examiner in understanding the chemical reactions used by Tsutsui, Applicants have provided in the attached Information Disclosure Statement a copy of the Journal of the American Chemical Society article from 1978 referenced in the "Other Publications" of Tsutsui (the "Tsutsui Article") as well as a copy of the work by Schrauzer referenced in Tsutsui. The Tsutsui article, in combination with the disclosure of Tsutsui, render it clear that the transition metal (i.e., Vanadium) reacts with an alcohol to form a transition metal alcoholate. The alcoholate then acts as a hydrogen donor which reduces molecular nitrogen (by adding hydrogen) to form ammonia (NH₃).

Accordingly, the transition metal alcoholate disclosed in Tsutsui is nothing more than a **reactant** which provides, among other things, hydrogen to be reacted with, for example, nitrogen. This reaction generates ammonia (the primary goal disclosed in Tsutsui). Accordingly, while Tsutsui may appear similar to the claimed invention due to certain language utilized therein, Tsutsui is nothing more than *traditional photochemistry* whereby a reactant transition metal alcoholate interacts with particular disclosed radiation to regenerate the alcoholate so that more hydrogen is available for reaction with nitrogen.

Applicants direct the attention of the Examiner to page 4, lines 13-14 of the Applicants' specification:

A catalyst is a substance which alters the reaction rate of a chemical reaction *without appearing in the end product* (emphasis added).

Accordingly, it is clear that Tsutsui is not an appropriate §102 reference.

§102 (e) REJECTION—MOHR

Claims 1-4, 9 and 13 were rejected under 35 USC §102(e) as being clearly anticipated by Mohr (US Patent 6,217,712, hereinafter "Mohr"). Applicants respectfully traverse this rejection.

In particular, Applicants respectfully submit that Mohr is non-enabling with respect to the claimed invention.

In particular, a reference must sufficiently describe the claimed invention to have placed the public in possession of the claimed invention. Mohr is deficient in this regard. Specifically, Mohr discloses at column 3, lines 47-52 the following:

"Where the selected catalyst is platinum the radio frequency transmission is in the order of 9.29 megahertz. This frequency and the frequencies of other catalysts are commonly listed in NMR tables and are readily available to those skilled in the relevant art."

Mohr fails to recognize the critical component that the nuclear magnetic resonance frequency is a function of magnetic field strength in all NMR tables. In this regard, Table 1 below lists a variety of published magnetic fields strengths (in Tesla) and the associated frequency for ¹⁹⁵Pt. The magnetic field strength of the earth typically varies between 30,000nT (nT = nano-Tesla) and 60,000 nT (i.e., about 0.00003 – 0.00006 Tesla). How or why the frequency of 9.29 megahertz works in Mohr is unknown. The reference does not place the public in possession of the claimed invention.

TABLE 1
NMR FREQUENCIES FOR ¹⁹⁵Pt

<u>Magnetic Field Strength (T)</u>		<u>Frequency</u>
0.4 T ^a	0.2146202	MHz
4.70 T ^b	43	MHz
7.05 T ^b	64.5	MHz
7.2 T ^c	64.414	MHz
9.4 T ^b	86	MHz
11.7 T ^b	107	MHz
11.744 T ^d	107.495	MHz
14.1 T ^b	129	MHz
16.9 T ^b	155	MHz
17.6 T ^b	161	MHz
19.6 T ^b	178	MHz
21.2 T ^b	21.2	MHz

a – Hebrew University; Nuclear Magnetic Resonance Laboratory.
<http://drx.ch.huji.ac.il/nmr/techniques/1d/row6/pt.html>

b – Florida State University, University of Florida, and Los Alamos National Laboratory; National High Magnetic Field Laboratory.
<http://nmr.magnet.fsu.edu/resources/nuclei/Pt.htm>

c – Chemistry Department, University of York.
http://www.york.ac.uk/depts/chem/services/nmr/Periodic_Table_Nucleus-Name-Order.html

d - BRUKER Analytik GmbH, Teodor Parella; NMR Periodic Table.
<http://www.bruker.de/guide/enMR/chem/PT.html>

§103 REJECTION—LICHTIN IN VIEW OF TSUTSUI

Claims 1-4, 7-13 and 15 were rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 4,861,484 to Lichtin et al (hereinafter referred to as “Lichtin”) in view of Tsutsui. Applicants respectfully traverse this rejection.

As noted previously, the broad spectrum UV-Vis radiation disclosed in Lichtin is most likely “typical” photochemistry radiation used in the art. The Action attempts to combine Tsutsui (discussed above) with Lichtin to overcome the previously noted deficiencies of Lichtin as a §102 reference. However, the Action’s conclusion on page 8 thereof is improper and is due to hindsight alone. Specifically, the Action states: “...Tsutsui discloses how the ordinary artisan would select

the best wavelengths ...of the CATALYST (emphasis added) to effect the desired change in said catalyst.....". This conclusion is clearly incorrect. Tsutsui, at best, discloses certain traditional photochemistry wavelengths used to assist reducing agents (i.e., transition metal alcoholates) to be regenerated so that the reducing agents can continue to function as reactants in the disclosed reactions (e.g., transition metal alcoholates can continue to provide hydrogen to react with nitrogen to form ammonia).

Tsutsui does nothing to overcome the deficiencies in Lichtin. Thus, in view of the above remarks, Applicants respectfully request withdrawal of this §103 rejection.

§103 REJECTION—PRATT IN VIEW OF VLADIMIROV AND CRONHEIM

Claims 1, 3, 4, 7, 8 and 10-15 were rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 4,115,280 to Pratt, Jr. (hereinafter referred to as "Pratt") in view of Vladimirov (1988, abstract only) and Cronheim (1937, abstract only). Applicants respectfully traverse this rejection.

Pratt was previously applied as a 102 reference. The Action admits that Pratt does not teach the use of a duplicated spectral pattern to augment the catalyst (see page 9, last full paragraph). Both of Cronheim and Vladimirov are added in an attempt to overcome the acknowledged deficiency of Pratt. Applicants understand how the Action combines the cited references, but respectfully submit that the combination is due to the insidious effect of a hindsight syndrome which utilizes applicants' own teachings to create the combination rejection.

For example, Pratt teaches at Column 10 line 62, through Column 11 line 16, that the disclosed deactivating or denaturing process of Pratt is not like burning (e.g., the excitation of electronic states) wherein energy introduced by burning (i.e., combustion) is primarily introduced to the electronic levels of the molecules. Rather, Pratt focuses on vibrational and rotational frequencies of various species (i.e., frequencies not associated with visible light).

In contrast, the disclosure of Cronheim is focused exclusively on the visible light portion of the spectrum. Moreover, four different types of catalytic processes are mentioned in the brief disclosure. The processes are likely traditional photochemistry. The motivation to combine these references exists only due to hindsight.

To assist the Examiner in understanding Vladimirov, Applicants have provided a full copy of the cited reference. Vladimirov also utilizes the visible light portion of the

spectrum (as well as ESR spectroscopy). Vladimirov utilizes these portions of the spectrum to determine changes in structure of molecules. Vladimirov recognizes that these changes in structure of SOD correspond to different activities of SOD. However, Vladimirov is silent regarding changes in absorption causing changes in activity. Vladimirov ascribes changes in activity to changes in structure (i.e. protonation) and merely uses absorbance spectroscopy as a tool to determine the structure. The motivation to combine Vladimirov with either Pratt or Cronheim is clearly due to hindsight.

Applicants appreciate the Examiner's detailed reasoning provided in the Action. Applicants believe that all issues contained therein have been addressed in the above response.

Accordingly, Applicants respectfully request issuance of a Notice of Allowability directed to claims 1-15.

Should the Examiner deem that any further action by Applicants should be desirable, the Examiner is invited to telephone Applicants' undersigned representative.

Respectfully submitted,



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